5.—NOTES ON THE DISTRIBUTION IN SOUTH WESTERN AUSTRALIA OF *ECHIDNOPHAGA MYRMECOBII* ROTHSCHILD.

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The "stickfast" flea, *Echidnophaga myrmecobii,* is a native species which was originally described from various Western Australian mammals. With the disappearance of many of these mammals from their former haunts, however, and the spread of the rabbit, the latter has become the principle host of this flea in the South-Western portion of the State.

The following observations were commenced in June, 1940, when an attempt was made to determine the types of fleas carried by rabbits, the distribution of the fleas, the degree of infestation, and the seasonal fluctuations of the parasites.† It was not possible, with the time and facilities available, to carry out the investigations with sufficient detail to provide full statistical data to support the observations made, but it was felt that the particulars obtained were of sufficient interest to warrant the publication of these notes, which may serve as a useful foundation for any later work carried out on similar lines.

The various trips were made by car and rabbits were shot wherever possible and examined for fleas. Most of the rabbits were obtained at places adjacent to the road, but the numbers shot at the various localities were generally sufficient to establish whether fleas were present or not. Additional evidence was sought by inspecting trappers' catches, both in the field and in district freezing works. Details of these inspections have not been included in the table, but in all cases, they served to support the evidence gained from shooting in the surrounding neighbourhood. The three main survey trips were made in August and October, 1940, and in February, 1941, but many other subsequent records have been obtained, and the entire results are presented in the accompanying table.

Early in *August,* 1940, collections were made in various wheat belt districts, including Mandiga, Goomalling, Narrogin, and Katanning. Rabbits were examined in the freezing works at Northam, Katanning, and Narrogin. Infested rabbits were noted at Mandiga, Wongamine, South Goomalling, and the Northam Ice Works. Infestation was light in all cases.

In mid-August, the route being from Perth eastward to Merredin and northward to Northampton, parasitised rabbits were taken at the following localities:—Jennacubbine, Goomalling, Wyalkatchem, Yelbeni, Mandiga, Kulja, Irwin, Dongara, Geraldton, Carnamah. In general, rabbits were lightly infested, and in several instances only one or two fleas were found. A record of heavy infestation however, was obtained at Booralaming, and a further one at Carnamah. Evidence was obtained of clean and infested rabbits living in neighbouring colonies. Severe drought conditions were prevailing at the time, and the reduced rabbit population may not have been

† The purpose of this survey was to determine whether fleas were sufficiently numerous and widespread to serve as vectors of the rabbit virus (*Myxomatosis cuniculi*) and so assist in wholesale rabbit destruction. The first main trip was made in company with Mr. M. W. Mules an officer of the Animal Health Division of the Council for Scientific and Industrial Research and intimately associated with the Commonwealth's *Myxomatosis* research programme.

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favourable for the optimum development of ectoparasites. The next observations were made at the end of August, 1940, when some 20 or 30 rabbits were examined in the Lake Grace district without any trace of flea parasites being noticed. On the return journey, two lightly infested rabbits were obtained, one at Corrigin and the other at Quairading.

TABLE I.

Locality.	Date.	Number of Rabbits Examined.	Number of Infested.	Degree of Infestation.
Bencubbin	14–10–40	3	3	light*
Do.	6–5–43	2	0	
Do.	28–8–43	5	0	
Beverley	7–10–43	4	0	
Do.	24–11–43	3	0	
Booralaming	1940	1	1	heavy
Bowes	17–8–40	13	0	
Do.	2–3–41	4	0	
Bridgetown	24–9–41	5	0	
Do.	7–2–42	5	0	
Do.	11–12–42	7	0	
Capel	15–12–41	4	0	
Carnamah	20–8–40	11	1	heavy
Do.	17–10–40	3	0	
Do.	3–3–41	9	1	light
Chittering	21–8–40	6	0	
Do.	5–3–41	5	0	
Do.	23–9–41	2	0	
Coorow	21–8–40	5	0	
Corrigin (10 miles east)	29–8–40	1	1	light
Dalwallinu (10 miles west)	15–8–40	2	0	
Do.	15–10–40	2	0	
Do.	26–2–41	5	5	light
Dongara	16–8–40	2	2	light
Frankland River	4–1–41	5	0	
Gabbin	26–2–41	1	1	moderate
Geraldton (10 miles east)	17–8–40	11	1	light
Goomalling	13–8–40	4	4	light
Do.	24–2–41	5	5	heavy
Grass Valley	11–10–40	1	1	light
Do.	11–11–42	2	0	
Do.	5–11–43	5	0	
Do.	24–11–43	2	0	
Irwin	16–8–40	1	1	light
Isseka	2–3–41	9	0	
Do.	14–9–42	4	0	
Jennacubbine	13–8–40	1	1	light
Katanning	22–7–40	5	0	
Kukerin	27–8–40	2	0	
Kulja	15–8–40	1	1	light
Kununoppin	13–10–40	5	5	light
Lake Grace	28–8–40	27	0	
Manjimup (Bubarrup)	5–1–41	15	0	
Mingenew	19–8–40	6	0	
Do.	17–10–40	4	0	
Do.	19–5–41	1	1	light
Moora	17–10–40	4	0	
Do.	4–3–41	3	0	
Mandiga	14–8–40	7	7	light
Mt. Barker	3–1–41	1	0	

*Two or three fleas only.

Locality.	Date.	Number of Rabbits Examined.	Number of Infested.	Degree of Infestation.
Mukinbudin	5–5–43	3	0	
Mummballup	3–2–41	25	0	
Do.	11–2–42	22	0	
Nangeenan	12–10–40	13	12	light
Do.	3–5–43	20	1	light
Nansen	17–8–40	9	0	
Do.	14–9–42	6	0	
Newcarlbean	14–10–40	1	1	heavy
New Norcia	17–10–40	5	0	
Northamption	2–3–41	3	0	
Nungarin	13–10–40	1	1	light
Quairading (15 miles S.W.) ...	29–8–40	1	1	light
Roelands	2–11–40	4	0	
Toodyay	2–7–40	10	0	
Trayning	25–2–41	1	1	heavy
Seabrook	12–8–40	3	0	
Do.	9–10–40	4	0	
Do.	27–12–40	5	0	
Do.	8–11–43	3	0	
Do.	5–11–43	5	0	
Wagin	9–4–42	1	1	light
Wundowie	28–10–43	1	0	
Wyalkatchem	14–8–40	7	5	light
Yelbeni	14–8–40	4	4	light

In *October,* 1940, a hurried survey was made of many of the eastern and north-eastern and northern wheat belt districts visited in August. Rabbits were collected at Grass Valley, Nangeenan, Nungarin, Kununoppin, and Newcarlbean, and almost every animal examined was lightly or moderately infested. Further rabbits were shot at Mingenew, Dalwallinu, Carnamah, Moora, New Norcia, Bindoon and Chittering, but no fleas were discovered.

In late *November,* rabbits in the vicinity of Roelands were examined but carried no flea parasites.

In *January,* 1941, an examination was made of numerous rabbits in the lower South-West from Mount Barker, Muir's Bridge, Manjimup and Mummballup, but no fleas were collected.

In late *February,* 1941, the area covered in the late August of 1940 was again worked. Infested rabbits were collected at the main centres visited in August—Goomalling, Trayning, Gabbin, 10 miles west of Dalwallinu, and Dongara. The information obtained on the February trip showed the flea to have essentially the same distribution as in August, but there are several points of interest to note. Several rabbits shot near Dalwallinu were all slightly infested, whereas animals shot at this spot in August were clean. Again, in spite of a heavy infestation of rabbits at the spot sampled near Carnamah, only one infested rabbit was collected out of a number shot, giving comparable results to those obtained in August. Rabbits were shot on the return journey as in August, at Coorow, Moora, New Norcia, and Chittering,

but no fleas were seen. Some of the rabbits collected from Dongara and Greenough carried *E. gallinacea*, and these were the only localities from which this species was recorded during the census. Although the distribution of the flea proved to be generally similar in August, October and February, the October infestation appeared to be slightly more severe than the August one, and the February data showed a definite increase on that of the winter and spring months.

From a study of the accompanying map, it will be seen that the main flea infested areas are the Eastern and North-Eastern farming districts. The North coastal area, with the exception of one record East of Geraldton, and several records in August near Dongara, appears to be clean. The fact that none of the rabbits examined in the lower South-West and directly North of Perth carried fleas, indicates that the flea population in this region must be very low. Although no strict correlation between climate or soil type can be indicated, it would appear that the lighter rainfall areas of the State are the most favourable to the flea and that in this area, the light soil types are conducive to the most severe infestations.

That the flea population fluctuates violently, even in those areas which may be regarded as the most favourable, is indicated by the remarkably low counts recorded in 1943. No ready explanation is offering. It could not be due to a drop in the rabbit population, as actually an increase was evident. The good rainfall experienced in many districts may have had some significance, especially bearing in mind the absence of the flea from the better rainfall areas of the State. But much more research will be necessary before any satisfactory explanation can be presented as to the reason for the variable distribution and population indicated in the foregoing paper.

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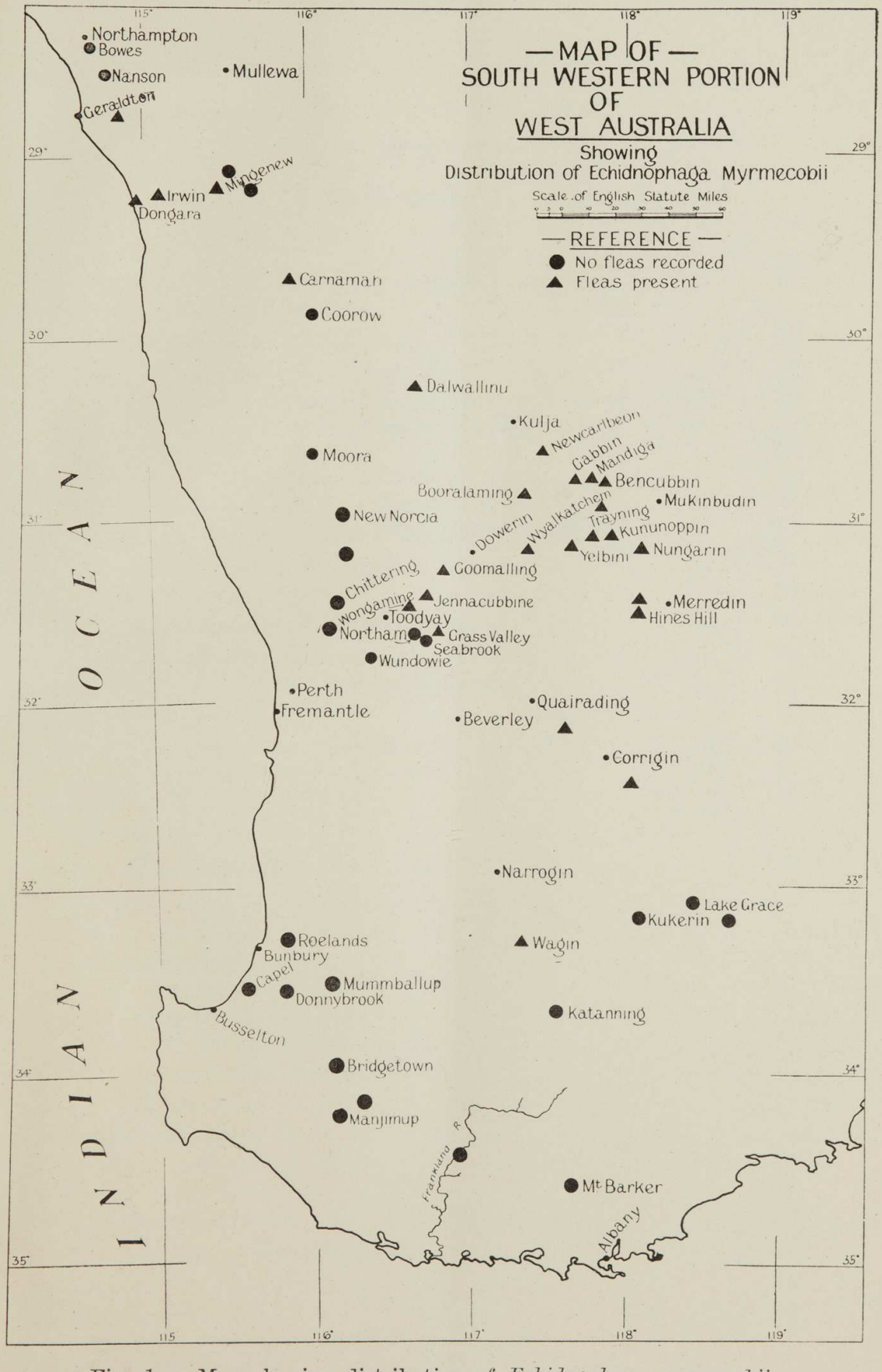

Fig. 1. Map showing distribution of *Echidnophaga myrmecobii.*